Revisions to the PIV Biometrics Specifications

 $800-76-1 \rightarrow 800-76-2$

Biometrics Consortium Meeting September 23, 2010

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Agenda

- Review industry trends in access control
- Fingerprint updates
 - Exception handling
 - Leveraging "lessons learned" on fingerprint enrollment
 - MINEX -- Level II Performance + Conformance Specification
- Second and third modalities
 - Iris
 - Face specifications exist for cards today
- Next step: Revision of NIST Special Publication 800-76-1
 - Release for public comment ~ October 2010
 - Second or final publication ~ January 2011

- 1. Notes on industry trends for access control
- 2. Fingerprint updates
- 3. Second modalities IRIS, MOC etc
- 4. Next steps

Part 1:
Biometrics for
Access Control

PIV Biometric Access Control









Biometric Industry Trends

- More devices
 - Single modalities and multiple modalities
- Smaller devices
 - Mobile capture
 - Iris, Face, Finger
- Standoff capture
 - Iris, Face gates and portals
- PACS systems using Face Recognition
 - Based on e-Passport
- One-to-one operation
 - With token
- One-to-many operation
 - Without token





- Notes on industry trends for access control
- 2. Fingerprint Updates
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Part 2:
Fingerprint
Updates

Fingerprint exception handling

- Install the content of the December 2008 biometric FAQ specifications http://www.idmanagement.gov/content/hspd12 faqs biometric.htm
 - into the upcoming revision of NIST SP 800-76.
- These cover the cases:
 - Zero fingers available (e.g. amputees) install signed empty object on card
 - One finger available acquire two impressions of the finger, and install signed object on the card
 - Poor quality during enrollment
 - Failed biometric verification attempt

Improving fingerprint enrollment

- Expand 800-76-2 guidance
 - Lessons learned in operations
 - Development work supporting worldwide programs
 - BioDev II (supporting fingerprints in DE e-Passports)
 - ISO/IEC 19794-4 Annex on image capture
- Beyond 800-76-2
 - NIST Fingerprint Image Quality software:
 NFIQ 1.0 → NFIQ 2.0

MINEX

Now

- Cross-vendor interoperability specification
 - Templates must be accurately matched by certified matching algorithms
 - Matchers must accurately match certified templates
 - FNMR < 0.01 at FMR = 0.01</p>

FUTURE

- Higher bar accuracy specification
 - FMR < 0.0001</p>
 - FMR < 0.00001</p>
 - Pooled templates
 - One + two finger authentication
- Threshold calibration
- Conformance
 - Of template generators

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Part 3: Second Modalities

Biometric Data on 7816 cards

- Fingerprint minutia (PIV mandatory) NOW
 - Minutiae from two fingers, standardized in INCITS 378
 - Record size is 500-700 bytes (excluding signature)
 - Supported by MINEX (Minutiae Exchange) tests and GSA certification
- Facial image (PIV optional) NOW
 - Single frontal face image, standardized in INCITS 385
 - Record size is approximately 20KB
 - Image is suitable for face recognition (both human and automated)
 - Specification is closely that of the e-Passport
- Iris Image (Specifications to appear in SP 800-76-2)
 - Images of one or two irises, standardized in ISO/IEC 19794-6:2011
 - Record size is approximately 3KB
 - Image is suitable for biometric verification

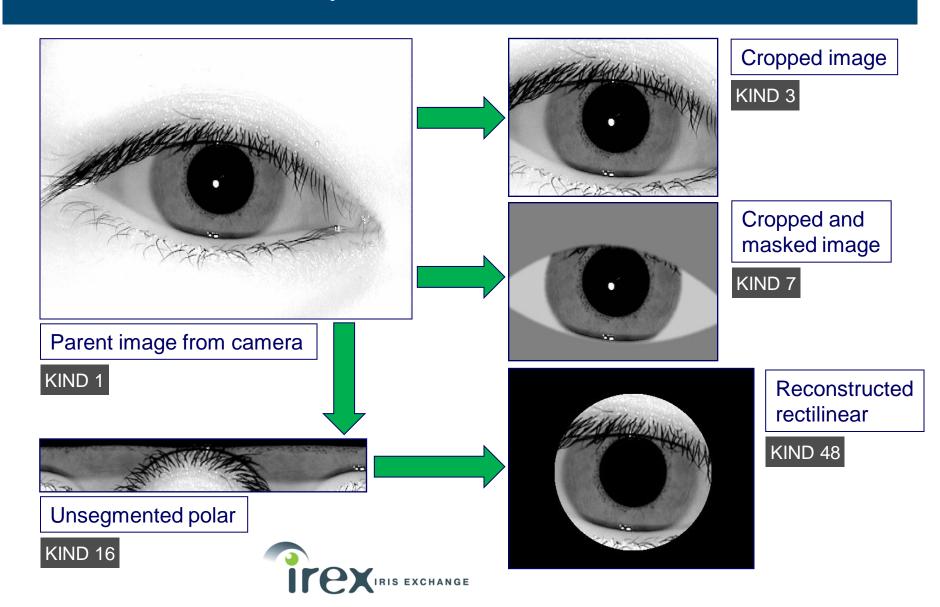
Iris specifications for PIV

- SP 800-76-2 specifications (under consideration):
 - Iris image (for card)
 - Iris image (for CMS)
 - Camera performance / properties / interface
 - Iris algorithm performance / properties
 - Conformance testing
- Comment is welcome
 - Now
 - On drafts of SP 800-76-2

IREX Test (Support for 1:1 and 1:N)

- NIST Interagency Report 7629, Sep 21, 2009
 - Performance of Iris Recognition Algorithms on Standard Images
- Quantitative support for ISO 19794-6 standard
 - Image size is about 3KB (for 1:1) and ~30KB (for 1:N)
 - Compression, cropping, formatting profiles
 - Speed-accuracy trade space
- Ten implementations of standardized interoperable iris image format
 - Num. iris providers has expand x10 in last five years
 - Num core technology providers in iris exceeds that for face recognition
- Iris image interoperability superior to minutia interoperability
 - Less dependency on the product that prepares the record
- http://iris.nist.gov/irex (or google "iris interoperability")

IREX :: Proposed standard formats

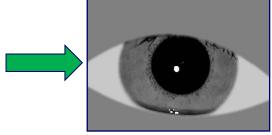


Use images, not templates



Parent image from camera





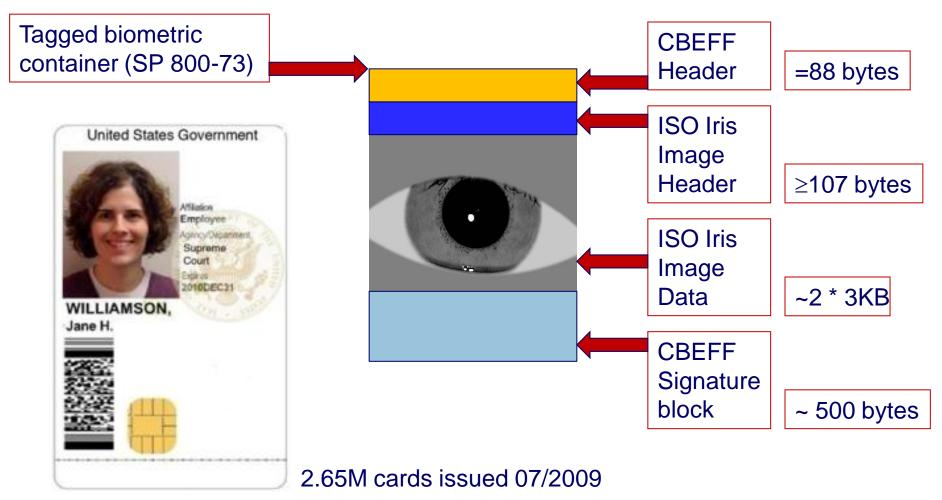
Cropped and masked image

KIND 7

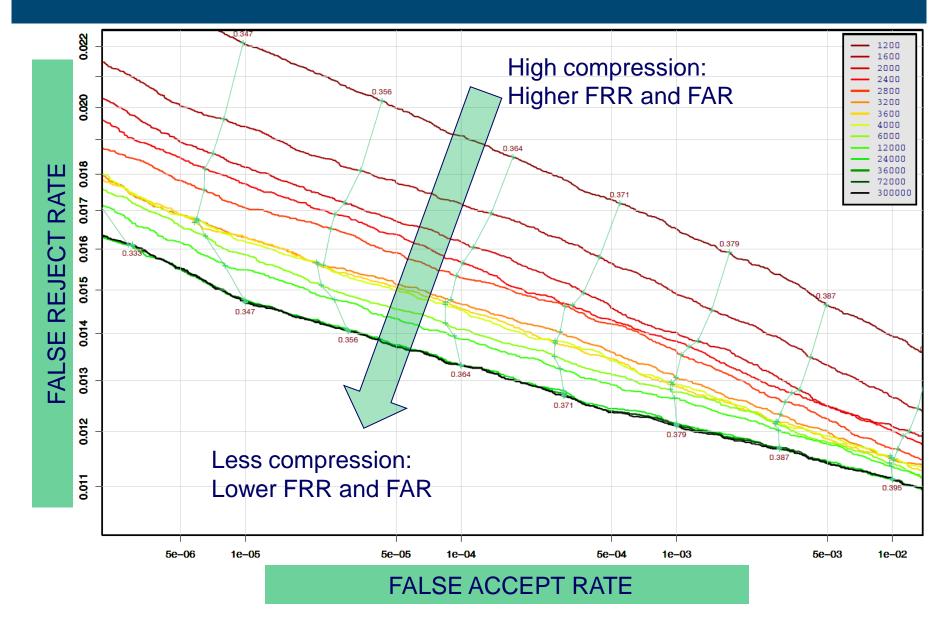
- Standard defines interoperable images
 - PIV will use these
 - US Registry of Biometric Standards will recommend these.
- Templates are
 - Proprietary, non-interoperable
 - Laden with intellectual property
 - Sometimes larger than the image itself
 - Not suitable for interoperable USG applications

Irises on PIV Cards

Following the arrangement of fingerprint minutia data on current PIV cards... Two irises in one container.



Recognition Error Under Compression



Compression + Format Recommendations

- Compression Don't do it!
 - Lossy compression does incremental damage to images.
 - Either no compression, or lossless may be sufficient.

	Re	commended	Target Record Size								
Role	Format	Compressor	2KB	4KB	8KB	16KB	32KB	64KB	128KB	256KB	307KB
All	KIND 1	Uncompressed									
All	KIND 3	Uncompressed									
All	KIND 7	Uncompressed									
All		PNG Lossless PNG Lossless									
			-						20-	70KB for 1:N	
1:N	KIND 3	JPEG 2000 Lossy									
4.NI	VIND 7	IDEC 2000 I									
1:N	KIND /	JPEG 2000 Lossy									
1:1	KIND 3	JPEG 2000 Lossy									
		3. 20 2000 2033y							3KB for 1:1		
1:1	KIND 7	JPEG 2000 Lossy							ווווטו טונט וווו		

Commercial entities (partial list)

IRIS CAMERAS

- Short distance
 - Crossmatch (US)
 - IrisID (LG) (US/KR)
 - Iris Guard (SU)
 - Jiris (KR)
 - Kalo-vision (US)
 - Kynen (US)
 - L1 (Securimetrics) (US)
 - Oki (JP)
 - Panasonic (JP)
- Distance
 - Aoptix (US)
 - Honeywell (US)
 - Hoyos Group / GRI (US)
 - L1 (US)
 - Sarnoff Corp (US)

IRIS RECOGNITION

- Aoptix (US)
- Cambridge University (UK)
- Cogent systems (US)
- Crossmatch Tech. (US)
- Honeywell (US)
- Iritech (KR)
- Jiris (KR)
- Kalo-vision (US)
- L1 (formerly Iridian) (US)
- LG (KR)
- Neurotechnology (LI)
- Smart Sensors (UK)
- MorphoTrak (FR/US)
- Sarnoff (US)

Iris cameras I



Power Indicator

LCD Window

(graphical display enhances interactive interface, communicates authentication status)

Iris Camera

(exclusive autofocus iris image aquisition process delivers rapid two eye enrollment/recog

Face Camera Illuminator

Face Camera for Credentialing Use

Up/Down Button

(motorized auto-drive for easy height adjustment)

Alphanumeric Keypad

(supports PIN input and workforce management interface)

Device-Embedded SmartCard Reader

(delivers LG TDentitym, token authentication with leading smartcards)











Iris Acquisition III – Stand-off capture



Walk-up-and-stop Kiosk-style



Portal, walk through style



Biometric Authentication

- Biometric release only from unlocked card
 - Unlock currently via six-digit PIN
 - Does it make sense to unlock via MOC?
- Should biometric data ever be free read?
 - To support PACS
 - Two more fingers, dedicated to MOC?
 - Revision of FIPS-201 would be needed
- FIPS 201 revision
- FIPS 140 revision

THANK YOU

INPUT IS WELCOME

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